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# मानक

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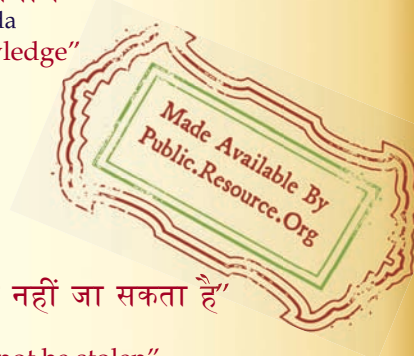
IS 10276-1 (1982): Edison screw lampholders, Part 1: Requirements and tests [ETD 23: Electric Lamps and their Auxiliaries]



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IS: 10276 ( Part I ) - 1982

*Indian Standard*

SPECIFICATION FOR  
EDISON SCREW LAMPHOLDERS

**PART I REQUIREMENTS AND TESTS**

UDC 621.316.581



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**INDIAN STANDARDS INSTITUTION**  
MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG  
NEW DELHI 110002

# Indian Standard

## SPECIFICATION FOR EDISON SCREW LAMPHOLDERS

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# *Indian Standard*

## SPECIFICATION FOR EDISON SCREW LAMPHOLDERS

### PART I REQUIREMENTS AND TESTS

#### 0. FOREWORD

**0.1** This Indian Standard was adopted by the Indian Standards Institution on 13 September 1982, after the draft finalized by the Electric Lamps and Accessories Sectional Committee have been approved by the Electrotechnical Division Council.

**0.2** This specification applies to lampholders to be used indoors or outdoors in residential as well as in industrial lighting installations. In locations where special conditions prevail, as for street lighting, on board ships, in vehicles and in hazardous locations, for example, where explosions are liable to occur, special constructions may be required.

**0.3** This specification does not apply to lampholders for special purpose, for example, advertisements signs stage lighting and illuminations, nor to special holders for heat radiators; special requirements for such lampholders are under consideration.

**0.4** This standard consists of two parts. Part I of the standard contains requirements and tests for edison screw lampholders and Part II contains dimensions for gauges for checking the interchangeability and safety of lampholders. This Part shall, therefore, be read in conjunction with Part II of this standard.

**0.5** This standard is based on the following standards published by International Electrotechnical Commission:

- a) IEC Publication 238 ( 1975 ) Edison screw lampholders,
- b) IEC Publication 61 ( Part 2 )-1969 Lamp caps and holders together with gauges for the control of interchangeability and safety, Part 2 Lampholders, and
- c) IEC Publication 61 ( Part 3 )-1969 Lamp caps and holders together with gauges for the control of interchangeability and safety, Part 3 Gauges.

**0.6** The specification is based on the following data relative to lamps for general lighting purposes:

- a) caps E14 are used for lamps with a current not exceeding 2A;
- b) caps E27 are used for lamps with a current not exceeding 4A; and
- c) caps E40 are used for lamps with a current not exceeding 16A.

**0.6.1** Lampholders without temperature marking:

- a) 110°C for E14 caps;
- b) 140°C for E27 caps; and
- c) 200°C for E40 caps.

**0.6.2** Lampholders with temperature marking: the marked temperature minus 25°C.

**0.7** For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the result of a test, shall be rounded off in accordance with IS : 2-1960\*. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

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## **1. SCOPE**

**1.1** This standard ( Part I ) specifies the requirements and tests for lampholders with edison thread E14, E27 and E40, designed for connection of lamps only to the supply.

**1.2** As far as it reasonably applies, the specification also covers lampholders which are, wholly or partly, integral with a luminaire or intended to be built-in into appliances. Independent lampholders, that is, backplate lampholders, not specifically intended for building-in, are also tested as luminaires.

## **2. TERMINOLOGY**

**2.0** The following definitions shall apply for the purpose of this specification:

**2.1 Cord Grip Lampholders** — A lampholder incorporating a method of retaining a flexible cord by which it may then be suspended.

**2.2 Threaded Entry Lampholder** — A lampholder incorporating a threaded component at the point of entry of the supply wires permitting the lampholder to be mounted on a mating threaded support ( formerly called nipple lampholder ).

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\*Rules for rounding off numerical values ( revised ).



**2.3 Backplate Lampholder** — A lampholder so designed as to be suitable for mounting by means of an associated or integral backplate, directly on a supporting surface or appropriate box.

**2.4 Terminal/Contact Assembly** — A part of assembly of parts which provide(s) a means of connection between the termination of a supply conductor and the contact making surfaces of the corresponding lamp cap.

**2.5 Outer Shell** — A cylindrical component protecting the user from contact with the lamp cap. It may or may not be provided with an external screw thread for fixing a shade ring.

**2.6 Screw Shell** — A cylindrical component having an internal screw thread of edison form for the retention of the corresponding lamp ( cap ). In some constructions, the screw shell is integral with the outer shell.

**2.7 Insulating Ring** — A cylindrical intermediate piece of insulating material separating a metal screw shell and a metal outer shell.

**2.8 Shade Ring** — A cylindrical component having an internal thread or other means to engage a corresponding support on the outer shell and intended to carry or retain a shade.

**2.9 Dome** — Part of a cord grip or threaded entry lampholder which shields the connecting terminals.

**2.10 Basic Insulation** — Insulation applied to live parts to provide basic protection against electric shock.

NOTE — Basic insulation does not necessarily include insulation used exclusively for functional purposes.

**2.11 Supplementary Insulation** — Independent insulation applied in addition to basic insulation in order to provide protection against electric shock in the event of a failure of basic insulation.

**2.12 Double Insulation** — Insulation comprising both basic insulation and supplementary insulation.

**2.13 Reinforced Insulation** — A single insulation system applied to live parts, which provides a degree of protection against electric shock equivalent to double insulation under the conditions specified.

NOTE — The term ' insulation system ' does not imply that the insulation must be one homogeneous piece. It may comprise several layers which cannot be tested singly as supplementary or basic insulation.

**2.14 Live Part ( Under Consideration )**

**2.15 Type Test** — A test or series of tests made on a type test sample, for the purpose of checking compliance of the design of a given product with the requirements of the relevant specification.

**2.16 Acceptance Tests** — Tests carried out on samples taken from a lot for the purpose of acceptance the lot.

**2.17 Routine Tests** — Tests carried out on each item to check requirements which are likely to vary during production.

### 3. STANDARD RATINGS

**3.1** Standard rated voltages are 250 V and 500 V.

For lampholders E14, switched-lampholders E27, and for drip-proof lampholders, a rated voltage of 250 V only is allowed.

NOTE — It is understood that the rated voltage of 500 V apply only to lampholders used in series circuits.

**3.2** Standard rated currents are:

- 2A, for lampholders E14;
- 2A, for switched-lampholders E27;
- 4A, for other lampholders E27; and
- 16A, for lampholders E40.

The rated current shall be not less than the standard value.

**3.3** The rated operating temperature for lampholders intended for use in high temperature conditions shall not be lower than 140°C for E14 lampholders and not lower than 170°C for E27 lampholders.

NOTE 1 — A value for E40 lampholders is under consideration.

NOTE 2 — The values of the temperature marking shall be increased by steps of 10°C.

### 4. MATERIALS

**4.1** The materials for component parts of the lampholder shall be as follows:

<i>Component Part</i>	<i>Material</i>
a) Exterior case, inner shell, metal body and parts ( excluding plungers and screws )	Brass, copper, aluminium ceramic or tough non-ignitable insulating materials
b) Plunger, screws and current carrying parts	Brass, copper, phosphur bronze
c) Spring	Non-corrosive material or material suitably treated to stand the corrosion and other tests

## 5. CLASSIFICATION

5.0 Lampholders are classified.

5.1 According to material of the case:

Lampholders of insulating material ( ceramic, bakelite, etc ) and metal lampholders.

NOTE — Lampholders with a case consisting partly of metal and lampholders, comprising external parts of insulating material with a conductive outer surface, for example, a metalized outer shell, are considered as metal lampholders ( see 10.4 ).

5.2 According to degrees of protection against moisture:

Ordinary lampholders; and

Drip-proof lampholders.

5.3 According to method of fixing:

Nipple lampholders;

Suspension lampholders;

Backplate lampholders; and

Other lampholders without nipple.

## 6. DIMENSIONS

6.1 Dimensions of lampholders shall comply with relevant data sheets given in Part II of this standard.

6.1.1 Compliance is checked on one hand, by measuring in conformity with the sheet 7005-20 of Part II the dimension X being checked by means of the gauges according to Fig. 1, the screw thread of which is in accordance with the standard sheets, screw dimensions for caps, on the other hand with the aid of gauges according to the standard sheets 7006-25 and 7006-26 of Part II of this standard.

6.2 Lampholders shall allow insertion of all corresponding lamps so as to make contact.

Compliance is checked by means of gauges according to the standard sheets of Part II and according to the indications of these sheets:

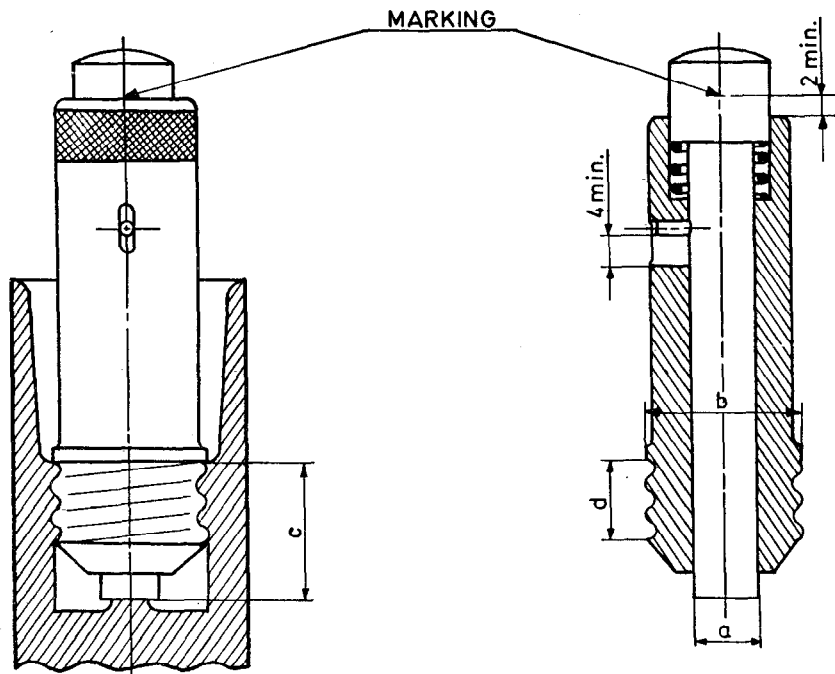
Lampholders E14: 7006-30 and 7006-31;

Candle lampholders E14: 7006-30 A and 7006-31;

Lampholders E27: 7006-21 and 7006-22; and

Lampholders E40: 7006-23 and 7006-24.

The checking of contact making is done on lampholders as delivered and after the tests of 12.7 and 12.8.2.



All dimensions in millimetres.

LAMPHOLDER	$a$	$b$	$c_1$	$d$
E14	$6.2 \pm 0.1$	$15 \pm 0.015$	$12 \pm 0.1$	8
E27	$11.5 \pm 0.1$	$28 \pm 0.015$	$17 \pm 0.1$	10
E40	$18 \pm 0.1$	$42 \pm 0.02$	$27 \pm 0.1$	20

$c_1$  is the value of  $c$  when marking coincides with upper edge of gauge. With the gauge screwed home it shall be possible to push the plunger so far that the marking coincides with or passes the top of the gauge.

FIG. 1 GAUGE FOR MINIMUM DISTANCE FROM OUTER END OF SCREWED SHELL TO CENTRAL CONTACT

**6.3** The following dimensions shall be not less than the values shown in the following table:

	<i>E14</i> mm	<i>E27</i> mm	<i>E40</i> mm
Thickness of the screwed shell, if any:			
When unsupported	0.30	0.30	0.50
When supported over a total distance of at least three-quarters of the circumference of the shell by insulating material right into the thread	0.25	0.25	0.40
Thickness of side or central contacts, if resilient	0.30	0.40	0.50

Compliance is checked by measurement.

NOTE 1 — Thicknesses are measured by means of a micrometer with pointed noses and ratchet screw.

NOTE 2 — For the screwed shell, two sets of three measurements are made, each set carried out on one of two different generating lines of the screwed shell. The mean value of the six measurements shall be at least equal to the specified value.

**6.4** The effective length of screw engagement, if any, of outer shell and dome shall meet one of the following requirements whereby the engagement shall always be over one full turn:

either the effective length shall be not less than the values shown in the following table:

	<i>E14</i> mm	<i>E27</i> mm	<i>E40</i> mm
Metal lampholders:			
For rolled thread	5.0	7.0	10.0
For cut thread	5.0	5.0	7.0
Lampholders of insulating material	5.0	7.0	10.0

or the effective length shall be at least two turns provided the test according to 12.6.3 is withstood with a torque equal to 1.2 times the torque given in 12.6.2.

Compliance is checked by measurement.

**6.5** The female nipples of lampholders shall be provided with one of the following screw threads:

Lampholders E14: ( M8 × 1 ) or M10 × 1;

Lampholders E27: M10 × 1, M13 × 1, M16 × 1;

Lampholders E40: M13 × 1, M16 × 1.

**6.5.1** The nipple thread shall comply with Fig. 2A or 2B.

Compliance is checked by measurement and by means of gauges according to Fig. 3A or 3B.

**6.6** The dimensions of nipples and set screw, if any, shall be not less than the values shown in the following table:

Nominal nipple diameter	$\left\{ \begin{array}{l} \text{M8} \times 1 \\ \text{M10} \times 1 \\ \text{M13} \times 1 \end{array} \right.$		M16 $\times$ 1
	mm	mm	
Length of thread:			
Metal nipple	5.0	8.0	
Nipple of insulating material	7.0	10.0	
Diameter of set-screw:			
Screw with head	2.6	3.0	
Screw without head:			
In case of one screw	3.0	4.0	
In case of more than one screw	3.0	3.0	

A negative deviation of 0.15 mm from the nominal values for thread diameter is allowed.

Compliance is checked by measurement.

**6.7** Lampholders shall be so designed that they do not interfere with the proper engagement or disengagement of lamps, even if the lamp cap is slightly dented. In no case shall the holder contacts present a cutting edge to the lamp cap. Compliance is checked by inspection and by the tests of **10.6**.

**6.8** Deviations from the standard dimensions are allowed only if they provide a special technical advantage and do not interfere with the purpose of lampholders and lamps in accordance with the standard dimensions.

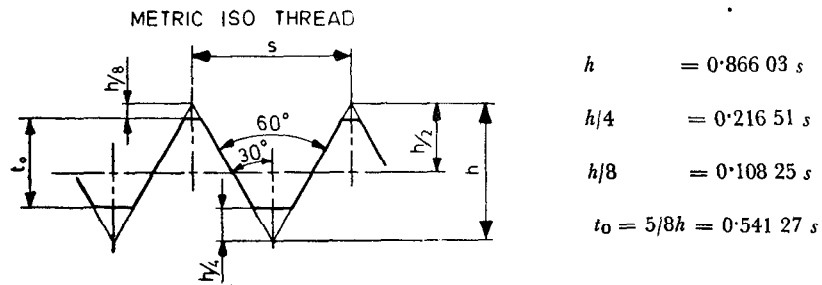
## **7. PROTECTION AGAINST ELECTRIC SHOCK**

**7.1** Lampholders shall be so designed that live parts of the lampholder ready for use and of a corresponding normal lamp, when fully inserted, are not accessible.

Compliance is checked by means of gauges according to the standard sheets of Part II and according to the indications of these sheets:

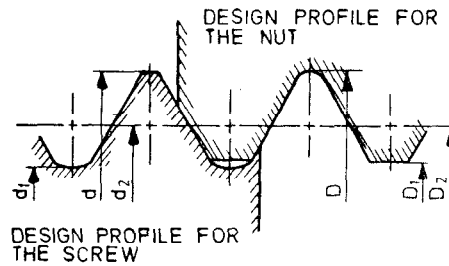
- Lampholders E14: 7006-31;
- Lampholders E27: 7006-22; and
- Lampholders E40: 7006-24.

**NOTE** — It is recommended that a voltage of at least 40 V be used for this checking.



**Basic profile\***

\*The basic profile is the profile to which the deviations which define the limits of the external and the internal threads are applied.

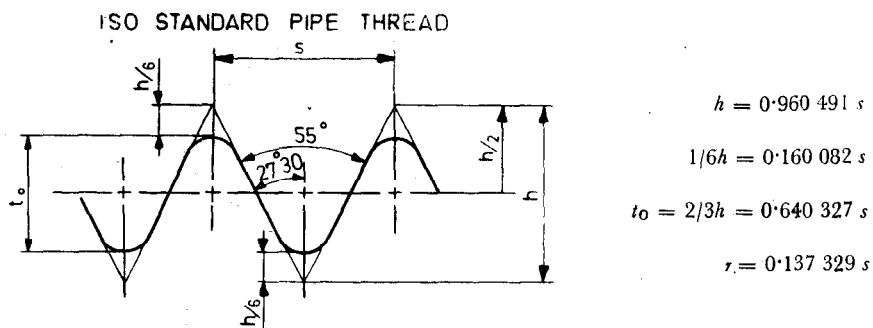


**Limit dimensions**

All dimensions in millimetres.

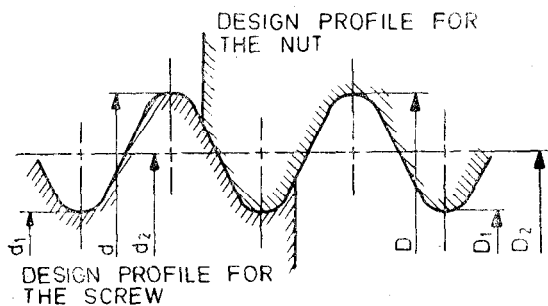
DESIGNATION	s	SCREW					NUT				
		d		d <sub>2</sub>		d <sub>1</sub>	D	D <sub>2</sub>		D <sub>1</sub>	
		Max	Min	Max	Min	Max	Min	Min	Max	Max	Min
M 8 × 1	1	8.000	7.800	7.350	7.238	6.917	8.000	7.462	7.350	7.117	6.917
M 10 × 1	1	10.000	9.800	9.350	9.238	8.917	10.000	9.462	9.350	9.117	8.917
M 13 × 1	1	13.000	12.800	12.350	12.190	11.917	13.000	12.510	12.350	12.117	11.917
M 16 × 1	1	16.000	15.800	15.350	15.190	14.917	16.000	15.510	15.350	15.117	14.917

FIG. 2A NIPPLE THREAD FOR LAMP HOLDERS. BASIC PROFILE AND DESIGN PROFILE FOR THE NUT AND FOR THE SCREW



Basic profile\*

\*The basic profile is the profile to which the deviations, which define the limits of the external and the internal threads, are applied.



Limit dimensions

All dimensions in millimetres.

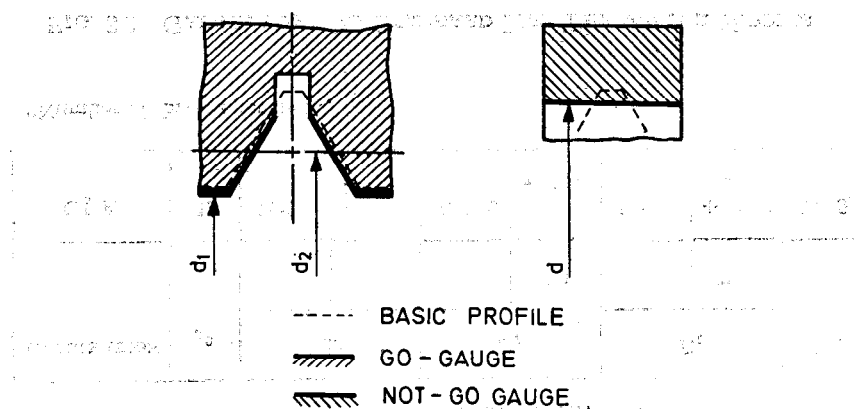
DESIGNATION	n*	SCREW						NUT				
		d		d <sub>2</sub>		d <sub>1</sub>		D	D <sub>2</sub>		D <sub>1</sub>	
		Max	Min	Max	Min	Max	Min	Min	Max	Min	Max	Min
G $\frac{3}{8}$ A	19	16.662	16.412	15.806	15.681	14.950	14.794	16.662	15.931	15.806	15.395	14.950

\*Number of threads per inch.

FIG. 2B NIPPLE THREAD FOR LAMP HOLDERS. BASIC PROFILE AND DESIGN PROFILE FOR THE NUT AND FOR THE SCREW



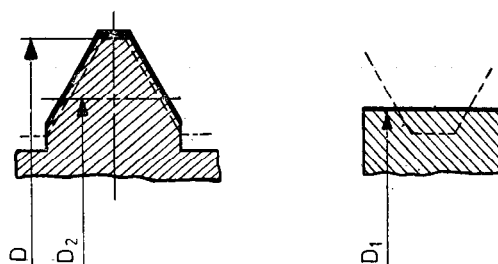
# GAUGES FOR THE SCREW



All dimensions in millimetres.

DESIG- NATION	s	d		d <sub>2</sub>		1		WEAR
			Tol		Tol		Tol	
M 8×1	1	7·800	+0·004 -0·004	7·350	-0·012 -0·020	6·917	+0·004 -0·004	0·012
M 10×1	1	9·800	+0·004 -0·004	9·350	-0·012 -0·020	8·917	+0·004 -0·004	0·012
M 13×1	1	12·800	+0·004 -0·004	12·350	-0·012 -0·020	11·917	+0·004 -0·004	0·012
M 16×1	1	15·800	+0·004 -0·004	15·350	-0·012 -0·020	14·917	+0·004 -0·004	0·012

# GAUGES FOR THE NUT

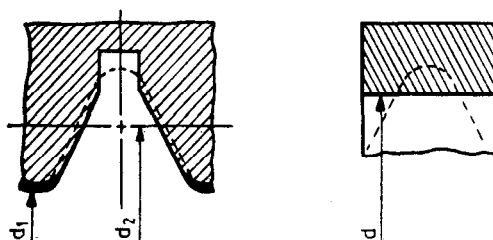


All dimensions in millimetres.

DESIG- NATION	s	D		D <sub>2</sub>		D <sub>1</sub>		WEAR
			Tol		Tol		Tol	
M 8×1	1	8·000	+0·004 -0·004	7·350	+0·012 +0·020	7·117	+0·004 -0·004	0·012
M 10×1	1	10·000	+0·004 -0·004	9·350	+0·012 +0·020	9·117	+0·004 -0·004	0·01
M 13×1	1	13·000	+0·004 -0·004	12·350	+0·012 +0·020	12·117	+0·004 -0·004	( 1
M 16×1	1	16·000	+0·004 -0·004	15·350	+0·012 +0·020	15·117	+0·004 -0·004	- 12

FIG. 3A GAUGES FOR METRIC ISO THREAD FOR NIPPLES

## GAUGES FOR THE SCREW

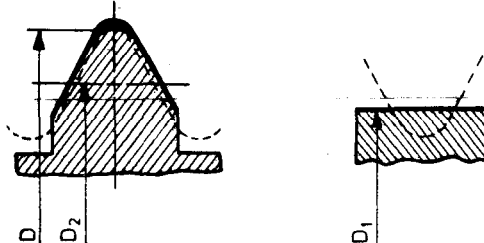


----- BASIC PROFILE  
 // GO - GAUGE  
 /// NOT - GO GAUGE

All dimensions in millimetres.

DESIGNATION	$n^*$	$d$		$d_2$		$d_1$		WEAR
			Tol		Tol		Tol	
$G\frac{1}{2}A$	19	16.412	0 -0.008	15.806	0 -0.020	14.950	0 -0.018	—

## GAUGES FOR THE NUT



----- BASIC PROFILE  
 // GO - GAUGE  
 /// NOT - GO GAUGE

All dimensions in millimetres.

DESIGNATION	$n^*$	$D$		$D_2$		$D_1$		WEAR
			Tol		Tol		Tol	
$G\frac{1}{2}A$	19	16.662	+0.018 +0.005	15.806	+0.005 +0.028	15.395	+0.008 0	0.005

\*Number of threads per inch.

FIG. 3B GAUGES FOR ISO-STANDARD PIPE THREAD FOR NIPPLES

**7.2** Lampholders E14 and E27 shall be so designed that lamp caps with the exception of E27/30 are inaccessible when they become alive during insertion.

**7.2.1** Compliance is checked by means of the gauges shown in the standard sheets of 7006-31 and 7006-22A of Part II and according to the indications of these sheets.

**NOTE** — It is recommended that a voltage of at least 40 V be used for this checking.

**7.3** Parts providing protection against accidental contact with the lamp cap shall be reliably secured so that they will not become detached when a tightly fitting lamp is removed. If a lampholder can be dismantled without the aid of a tool, the removal of these parts shall make the lampholder obviously useless.

**7.3.1** Compliance is checked by inspection and by manual test.

**NOTE** — Details of a well-defined test are under consideration.

**7.4** External parts of:

drip-proof lampholders,  
lampholders with a rated voltage of more than 250 V, and  
switched-lampholders

shall be of insulating material, with the exception of nipples and of those parts which cannot become alive even in the event of a fault.

Lacquer or enamel is not deemed to provide adequate protection for the purpose of this clause.

**7.4.1** Compliance is checked by inspection.

## **8. PROVISION FOR EARTHING**

**8.1** Nipple lampholders, suspension lampholders and backplate lampholders, with provisions for earthing, other than those provided with connecting leads, shall have at least one internal earthing terminal; other lampholders without nipple, for example, lampholders for building-in, may be provided with an external earthing terminal.

**8.2** Accessible metal parts of lampholders with earthing terminal, which may become live in the event of an insulation fault, shall be permanently and reliably connected to the earthing terminal.

**NOTE** — For the purpose of this requirement, small isolated screws and the like for fixing bases or covers are not deemed to be accessible parts which may become live in the event of an insulation fault.

**8.3** The metal of earthing terminals shall be such that there is no risk of corrosion resulting from contact with the copper of the earthing conductor.

The screw or the body of the earthing terminal shall be of brass or other metal no less resistant to corrosion, and the contact surfaces shall be bare metal.

**NOTE** — The risk of corrosion is particularly great when copper is in contact with aluminium.

**8.4** It shall not be possible to loosen the earthing terminal screw or nut without the aid of a tool.

**8.5** Metal parts of the cord anchorage, including clamping screws, shall be insulated from the earthing circuit.

## **9. TERMINALS**

**9.1** Lampholders, other than those provided with connecting leads (tails), shall be provided with terminals which allow connection of conductors having the following nominal cross-sectional areas:

0.5 to 0.75 mm<sup>2</sup> for lampholders E14 with M10 × 1 nipple;

0.75 to 1.5 mm<sup>2</sup> for lampholders E14 and lampholders E27 with M10 × 1 nipple;

0.75 to 2.5 mm<sup>2</sup> for other lampholders E27;

1.5 to 4 mm<sup>2</sup> for lampholders E40 with a rated current of 16A;

2.5 to 6 mm<sup>2</sup> for lampholders E40 with a rated current of 32A.

Compliance is checked by inspection and by fitting conductors of the smallest and largest cross-sectional area specified, the conductors with a cross-sectional area of 0.5 mm<sup>2</sup> and 0.75 mm<sup>2</sup> being flexible wires and the other conductors being of the solid type. Nipple lampholders are tested on a screwed conduit.

**9.2** Terminals shall be of the screw type or the method of connection shall be at least equivalent.

Terminal screws shall have a metric ( ISO ) thread or a thread comparable in pitch and mechanical strength.

**9.3** Terminals shall be fixed in such a way that they will not work loose when fastening or loosening the conductors.

**9.4** Terminals shall be so designed that they clamp the conductor between metal surfaces with sufficient contact pressure and without damage to the conductor. Terminals shall be so designed that they will prevent a conductor slipping out when the screws or nuts are tightened. They shall allow a conductor to be connected without special preparation ( for example,

soldering of the strands of the conductor, use of cable lugs, formation of eyelets, etc ).

**9.5** Terminals of the pillar type shall have minimum dimensions as shown in the following table:

<i>Lampholder</i>	<i>Nominal thread diameter</i>	<i>Diameter of hole for conductor</i>	<i>Length of thread in pillar</i>
	mm	mm	mm
E14	2.5	2.5	2.5
E27	3.5	3.5	2.5
E40	4	4.5	3.0

The length of the threaded part of the terminal screw shall be not less than the sum of the diameter of the hole for the conductor and the length of thread in the pillar.

The diameter of the hole shall be not more than 0.6 mm larger than the diameter of the screw ( maximum 0.4 mm on either side of the screw ). The length of the thread of the pillar is measured to the point where the thread is broken by the pillar hole.

**9.6** Screw terminals shall have minimum dimensions as shown in the following table:

<i>Lampholder</i>	<i>Nominal thread diameter</i>	<i>Length of thread under the head</i>	<i>Length of thread in nut</i>	<i>Nominal difference between diameter of head and shank of screw</i>	<i>Height of head of screw</i>
	mm	mm	mm	mm	mm
E14	3.5	4.0	1.5	3.5	2.6
E27	3.5	4.0	1.5	3.5	2.6
E40	5.0	7.0	3.0	5.0	3.0

If an intermediate part locked against rotation, such as a washer or a pressure plate, is used between the head of the screw and the conductor, the difference in diameter between head and shank of the screw may be reduced by 1 mm.

**9.7** Terminals shall be so located that, after correct fitting of the wires there is no risk of accidental contact between live parts or between such parts and accessible metal parts.

**9.8** Pillar terminals in which the end of the conductor is not visible shall have a length of hole beyond the terminal screw at least equal to half the value of the diameter of the screw of 2.5 mm, whichever is the higher.

**9.9** Terminals which are floating shall show no appreciable lateral play and shall not move longitudinally more than 3 mm when a lamp is removed or inserted.

**9.10** The requirements of 9.2 to 9.6 inclusive and 9.8 do not apply to lampholders intended to be factory-mounted in luminaires and which are provided with connecting leads ( tails ).

Lampholders intended to be factory-mounted in luminaires or built into appliances may be provided with connecting leads ( tails ), tab-terminals ( requirements are under consideration ) or equally effective means. In the case of heat-resistant leads, these shall be connected to the lampholder by soldering, welding or crimping.

## **10. CONSTRUCTION**

**10.1** The various parts of a lampholder shall be reliably connected together. Devices for fixing shades shall be so designed that the lampholder will not be dismantled by rotating the shade.

Compliance is checked by inspection, dismantling and by the tests of 12.6.

**10.2** Lampholders shall have a continuous metal screw thread of Edison form around the inside circumference for about two full turns. The minimum length of the screwed shell shall comply with the latest edition of standard sheet 7005-20 of Part II of this standard.

**10.2.1** In addition, the part carrying the contacts and the screwed shell shall be so constructed and located as to prevent canting or rotation which would impair the use of the lampholder.

Compliance is checked by inspection and manual test with the relevant gauge, referred to in 6, applied in all positions which can be achieved with reasonable force, and the holder shall still comply with the gauges, especially the feeler gauge of 0.08 mm × 5.0 mm.

Furthermore, it shall not be possible to score the neck of the bulb of a lamp made to normal standards during engagement and disengagement.

**10.3** There shall be ample space for the supply wires in the dome of the lampholder. Parts of the lampholder with which insulated conductors may come into contact shall have no sharp edges or a shape likely to damage the insulation.

Nipple lampholders shall be provided with means to prevent the conduit entering too far into the nipple.

**10.4** Accessible parts shall be of insulating material unless the design is such that a live wire detached from its terminal cannot touch accessible metal parts or parts of the earthing circuit and that terminal screws or nipple screws which have become loose cannot bridge accessible metal parts, including earthing terminals, and live parts.

**10.5** In case of lampholders with metal screwed shell and metal case, contact between these parts shall be prevented by an appropriate intermediate piece of insulating material which shall not be separable from the live parts or the metal case without using tools.

**10.6** It shall be possible to lock the nipple on the conduit. Except for angle lampholders, it shall be possible to operate the locking device from the inside.

NOTE — Locking of nipples from outside is also permitted.

**10.7** Suspension lampholders of the cord-grip type shall be provided with a device allowing the lampholder to be so fixed to a flexible cord that the conductors are relieved from strain, including twisting, where they are connected to the terminals, and that the outer covering of the cord is gripped in the lampholder and is protected from abrasion. It shall be clear how the relief from strain and the prevention of twisting is intended to be effected.

It shall not be possible to push the cord into the lampholder to such an extent that the cord is subjected to undue mechanical or thermal stress.

Makeshift precautions, such as tying the cord into a knot or tying the end with string, are not permissible.

The device shall be of insulating material or be provided with a fixed insulating lining if otherwise an insulation fault on the cord could make accessible metal parts live.

The design shall be such that the device:

- i) has at least one part fixed to or integral with the lampholder;
- ii) is suitable for the different types of flexible cord which may be connected to the lampholder;
- iii) does not exert excessive pressure on the cord; and
- iv) is unlikely to be damaged when it is tightened or loosened as in normal use.

**10.8** Suspending devices shall have no accessible metal parts which can become alive, even in the event of a fault in the lampholder; moreover, suspending devices intended to be screwed into nipple.

**10.9** Backplate lampholders not specifically intended for building-in shall have a recess for supply wires. This recess shall have the following minimum dimensions in order to allow back entry from a conduit perpendicular to the mounting surface of the lampholder:

Height : 7 mm;

Length : equal to diameter or width of the base; and

Width : 16 mm enlarged to a circular space 23 mm in diameter in the centre.

**10.10** The base of backplate lampholders, other than those specially intended for building-in shall be suitable for fixing means of screws with a diameter of at least 4 mm.

Compliance is checked by means of a gauge according to Fig. 4. For this test, the plug is inserted into the hole from the back and the bush is placed on the plug from the front. The bush shall enter the recess for the screw head.

**10.11** Backplate lampholders, other than those specifically intended for building-in, shall be provided with at least two cable entries to allow the introduction of cable covering or conduit so far as to afford complete mechanical protection at least for a distance of 1 mm, measured from the outside surface of the lampholder.

The cable entries may be on two diametrically opposed points, or placed side by side. The nominal diameters of the cable entries shall be 10.3 mm and 16.5 mm with a tolerance of  $\pm 0.3$  mm. For ceramic material, the tolerance is raised to  $^{+0.5}_{-0.3}$  mm.

**10.12** The contacts shall be designed and constructed so as to ensure during normal use effective and reliable electrical contact.

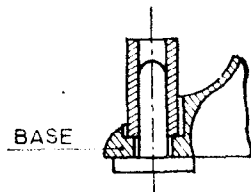
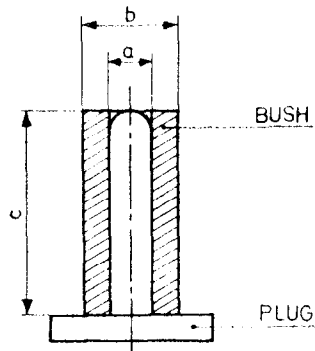
The functioning of the contacts shall be independent of the functioning of an optional locking device between the dome and the shell.

**NOTE 1** — In designing lampholders, care should be taken to prevent high side contact pressure as this usually results in low contact pressure on the centre-contact with consequentially large voltage drops.

**NOTE 2** — A single side-contact is allowed.

**10.13** Inlet openings of drip-proof lampholders shall allow the connection of the supply wires in such a way that drops of water running along the wires cannot reach the inside of the lampholder.





All dimensions in millimetres.

	DIMENSION	TOLERANCE	
		Manufacturing	Wear
<i>a</i>	4.1	+0.03 0	-0.03
<i>b</i>	8.2	+0.03 0	-0.03
<i>c</i>	18	±0.1	—

FIG. 4 GAUGE FOR HOLES FOR FIXING SCREWS FOR  
BACKPLATE LAMPHOLDERS

10.14 Lampholders shall not be fitted with a socket-outlet.

## 11. MARKING

11.1 Lampholders shall be marked with:


- a) rated current in amperes;
- b) rated voltage, in volts;
- c) mark of origin;
- d) rated operating temperature;
- e) type reference; and
- f) symbol for degree of protection against moisture, if applicable.

11.2 If symbols are used for current and voltage, *A* shall denote amperes and *V* volts.

Alternatively, figures may be used alone, the figure for the rated current being marked before or above that for the rated voltage and separated from the latter by a line.

The marking for current and voltage may accordingly be as follows:

$$2A \ 250 \ V \ \text{or} \ 2/250 \ \text{or} \ \frac{2}{250}$$

The symbol for protection against moisture shall be, for drip-proof lampholders, '  ' ( one drop ).

11.3 The marking of the degree of protection against moisture shall be on the outside of the case.

11.4 An earthing terminal shall be indicated by the symbol ' ⊥ '. This symbol shall not be placed on screws, removable washers or other easily removable parts.

11.5 Marking shall be indelible and easily legible.

11.6 Lampholders may also be marked with the ISI Certification Mark.

NOTE — The use of the ISI Certification Mark is governed by the provisions of the Indian Standards Institution ( Certification Marks ) Act and the Rules and Regulations made thereunder. The ISI Mark on products covered by an Indian Standard conveys the assurance that they have been produced to comply with the requirements of that standard under a well-defined system of inspection, testing and quality control which is devised and supervised by ISI and operated by the producer. ISI marked products are also continuously checked by ISI for conformity to that standard as a further safeguard. Details of conditions under which a licence for the use of the ISI Certification Mark may be granted to manufacturers or processors, may be obtained from the Indian Standards Institution.

## 12. TESTS

### 12.0 Classification of Tests

**12.0.1 Type Tests** — The following shall constitute the type tests:

- a) Visual examination ( see 12.1 );
- b) Dimensional checking ( see 12.2 );
- c) Moisture resistance test ( see 12.3 );
- d) Insulation resistance test ( see 12.4 );
- e) High voltage test ( see 12.5 );
- f) Mechanical strength test ( see 12.6 );
- g) Normal operation test ( see 12.7 );
- h) General resistance to heat ( see 12.8 );
- j) Resistance to heat, fire and tracking ( see 12.9 ); and
- k) Resistance to season cracking and to rusting ( see 12.10 ).

**12.0.1.1** The sample shall be tested as delivered and installed as in normal use, at an ambient temperature of  $27 \pm 2^{\circ}\text{C}$ .

All tests shall be carried out on a total of eight samples in the following order:

- a) Three samples — ( 12.1 to 12.5 );
- b) Three samples — ( 12.6 to 12.7 ); and
- c) Two samples — ( 12.8 to 12.9 ).

**12.0.2 Acceptance Tests** — The following shall constitute the acceptance tests:

- a) Visual examination ( see 12.1 );
- b) Dimensional checking ( see 12.2 );
- c) Insulation resistance dry test ( see 12.4.2 );
- d) High voltage test ( see 12.5 );
- e) Resistance to heat ( see 12.9 ); and
- f) Resistance to season cracking and rusting ( see 12.10 ).

**12.0.2.1** The sampling procedure and criteria of acceptance shall be subject to agreement between the supplier and the purchaser. In the absence of such an agreement, the sampling procedure detailed in Appendix A may be followed.

**12.0.3 Routine Tests** — The following shall constitute the routine tests:

- a) Visual examination ( see 12.1 );
- b) Dimensional checking ( see 12.2 ); and
- c) High voltage test ( see 12.5 ).

**12.1 Visual Examination** — The lampholder shall be examined visually for good workmanship.

**12.2 Dimensional Checking** — The dimensions of the various parts of the screw lampholders shall be checked with the help of the gauges and by measurements as per the requirements specified in 6.

### **12.3 Moisture Resistance Test**

**12.3.1** The enclosure of drip proof lampholders shall provide the necessary degree of moisture protection.

Compliance is checked by the following test:

Lampholders are fitted with the cables or conduits for which they are designed.

Backplate lampholders are mounted on a vertical surface with one drain hole, if any, open and directed downwards. Other lampholders are mounted with their openings pointing vertically downwards. They are subjected for 5 min to an artificial rain falling at a rate of 3 mm/min, vertically from a height of 2 m measured from the lampholder.

Immediately after this treatment, the lampholder shall withstand the same high voltage test as specified in 12.5.1, and inspection shall show that water has not entered to an appreciable extent.

NOTE — It is considered that water has entered to an appreciable extent if it has come into contact with live parts. In this case, an edison screw shell, which is only alive when a lamp is inserted, is not considered as a live part.

**12.3.2** Lampholders as whole shall be proof against humid conditions which may occur in normal use.

Compliance is checked by the humidity treatment described in this subclause followed immediately by the measurement of the insulation resistance and by the high voltage test specified in 12.5.

Cable entries, if any, are left open; if knock-outs are provided, one of them is opened.

The humidity treatment is carried out in a humidity cabinet containing air with a relative humidity maintained between 91 percent and 95 percent. The temperature of the air, at all places where samples can be located, is maintained within  $27 \pm 2^{\circ}\text{C}$  of any convenient value  $t$  between  $20^{\circ}\text{C}$  and  $30^{\circ}\text{C}$ .

Before being placed in the humidity cabinet, the samples are brought to a temperature between  $t$  and  $t + 4^{\circ}\text{C}$ .

Lampholders are kept in the cabinet for 24 hours for ordinary and for drip-proof lampholders.

NOTE 1 — In most cases, the samples may be brought to the specified temperature by keeping them at this temperature for at least 4 h before the humidity treatment.

NOTE 2 — Relative humidity between 91 percent and 95 percent can be obtained by placing in the humidity cabinet a saturated solution of sodium sulphate ( $\text{Na}_2\text{SO}_4$ ) or potassium nitrate ( $\text{KNO}_3$ ) in water, having a sufficiently large contact surface with the air. In order to achieve the specified conditions within the cabinet, it is necessary to ensure constant circulation of the air within and, in general, to use a cabinet which is thermally insulated.

**12.3.3** After this treatment, the lampholder shall show no damage within the meaning of this specification.

## **12.4 Insulation Resistance Test**

**12.4.1** Insulation shall be adequate:

- a) between poles;
- b) between live parts and external metal parts, including fixing screws of base or enclosure of back-plate lampholders, and accessible assembling screws; and
- c) between the inner and outer surfaces of the lining of metal enclosures, if such accessible lining is required in accordance with **10.4** to give protection.

**12.4.2** Compliance is checked by an insulation-resistance measurement and an electric strength test made immediately after the humidity treatment in the humidity cabinet, or in the room in which the samples were brought to the prescribed temperature.

NOTE — For carrying out acceptance tests humidity treatment mentioned in **12.3.1** and **12.3.2** shall not be carried out.

The insulation resistance is measured with a dc voltage of approximately 500 V, the measurement being made 1 min after application of voltage.

The insulation resistance is measured consecutively:

- a) between poles;
- b) between poles connected together and the body; and
- c) between accessible metal parts and metal foil in contact with the inner surface of insulating lining, if any.

The term 'body' used in item (b) includes external metal parts, fixing screws of the base and of the enclosure, accessible assembling screws and metal foil in contact with the surface of external insulating parts.

Measurements prescribed in items (a) and (b) are first made on the lampholder in which the test cap shown in Fig. 11 is inserted and then on the empty lampholder.

The switch, if any, is placed in the ' on ' position.

NOTE — If metal foil is used for the test on the empty lampholder, it shall also be in contact with the metal screwed shell if this shell has to be insulated from the contacts.

**12.4.3** The insulation resistance shall be not less than:

2 M  $\Omega$  for the measurement according to item (a); and

5 M  $\Omega$  in all other cases.

## 12.5 High Voltage Test

**12.5.1** Immediately after insulation resistance test, an ac voltage of substantially sinewave form, with a frequency of 50 Hz and with the rms value specified below is applied for 1 min between the same parts as indicated for the measurement of the insulation resistance.

<i>Rated Voltage</i> V	<i>Test Voltage</i> V
Up to and including 250	1 500
Over 250 up to and including 500	2 500

Initially not more than half the prescribed voltage is applied, then it is raised rapidly to this value.

No flashover or breakdown shall occur during the test.

NOTE 1 — The high-voltage transformer used for the test shall be so designed that, when the output terminals are short-circuited after the output voltage has been adjusted to the appropriate test voltage, the output current is at least 200 mA.

NOTE 2 — The overcurrent relay shall not trip when the output current is less than 100 mA.

NOTE 3 — Care is taken that the rms values of the test voltage applied is measured within  $\pm 3$  percent.

NOTE 4 — Glow discharges without drop in voltage are neglected.

## 12.6 Mechanical Strength Test

**12.6.1** Lampholders shall have adequate strength and shall withstand the strain due to the insertion of a lamp as well as that caused by the screwing of the lampholder to a conduit.

Compliance is checked by the tests of 12.6.2 to 12.6.7.

**12.6.2** The mechanical strength of the enclosure, the screwed shell and the dome is checked by screwing a test cap into the sample, the following torque being applied for 1 min:

0.5 Nm for candle lampholders E14, when the lampholder is fixed by the nipple;

1.2 Nm for candle lampholders E14, when the lampholder is clamped by the outer shell;

1.2 Nm for other lampholders E14;

2 Nm for lampholders E27; and

4 Nm for lampholders E40.

The test cap has dimensions as specified in the following table:

<i>Lampholder</i>	<i>Dimension S</i>	<i>Diameter of Central Contact</i>
	mm	mm
E14	5.5	4.8
E27	9.5	9.5
E40	11.0	14.0

For the meaning of the dimension *S*, ( see Fig. 15, 16 and 17 ).

The test is made twice; first with the sample clamped at the outer shell and secondly with the sample fixed by the nipple, dome or backplate, according to type of lampholder.

At the end of the test, the sample shall not show any change impairing its normal use.

**12.6.3** The dome or backplate of the sample is fixed and a torque as indicated under **12.6.2** is applied to the outer shell for 1 min so as to tighten the screwed connection between shell and dome.

This test shall cause neither loosening of the connection between shell and dome nor any other damage.

**12.6.4** The dome of nipple lampholders is fixed to a brass conduit in the normal way, the act-screws being tightened and the locking of the screwed nipple is tested by the application for 1 min of a torque as indicated under **12.5.2**, but counter-clockwise.

The application of this torque shall not loosen the nipple of the conduit.

If, however, the nipple loosens, the set-screw is further tightened with the smallest torque necessary to prevent the nipple from loosening during this test, and this minimum value is noted.

It is practical to increase the torque by increments of about 20 per cent during this test.

The minimum value of the torque applied should be noted.

For the tests under **12.6.2** to **12.6.4**, the use of an apparatus according to Fig. 5 is recommended.

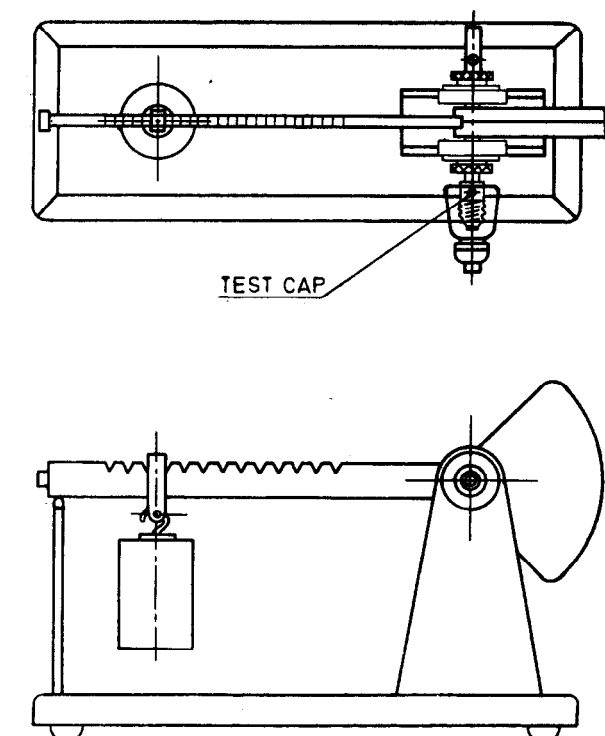


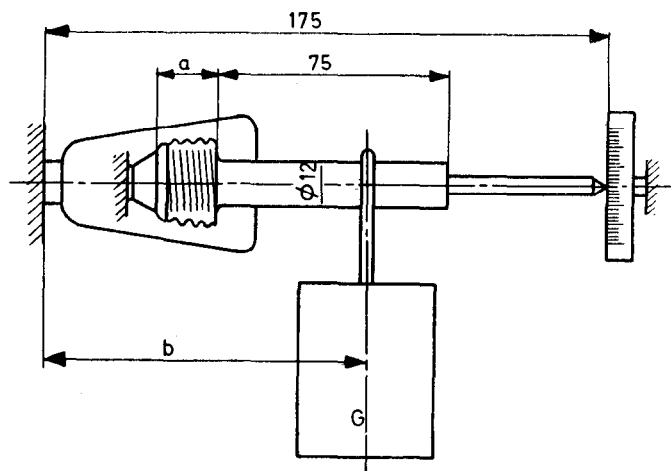
FIG. 5 TORQUE APPARATUS

**12.6.5** The strength of the connection between dome and nipple is checked as indicated in Fig. 6.

The sample is fixed by the nipple in a horizontal position. A mandrel with a thread having the maximum dimensions acceptable for caps, and with other dimensions according to Fig. 8 is screwed into the lamp-holder and is loaded for 1 min with a mass, as indicated in Fig. 8. The end of the mandrel shall not sag more than 5 mm.

The sample shall not be damaged. If a permanent deformation occurs, the sample is forced into the original position and the test is repeated five times, after which the sample shall show no damage impairing its normal use.





All dimensions in millimetres.

LAMP HOLDER	<i>a</i>	<i>b</i>	G kg
E14	19	100	1
E27	25	100	2
E40	37	140	3

FIG. 6 BENDING APPARATUS

**12.6.6** The mechanical strength of the outer shell of insulating material with or without a conductive outer surface and of rings of insulating material between the edison screw shell and the external parts of metal lampholders is tested in the impact test apparatus according to Fig. 7.

The pendulum consists of a steel tube with an external diameter of 9 mm and a thickness of 0.5 mm. It is suspended in such a way that it swings only in a vertical plane. A hammer weighing 0.15 kg is rigidly fixed to the lower end with its axis at a distance of 1 m from the suspension point. The striking part of the hammer is made of hardwood and has hemispherical surface of 10 mm radius.

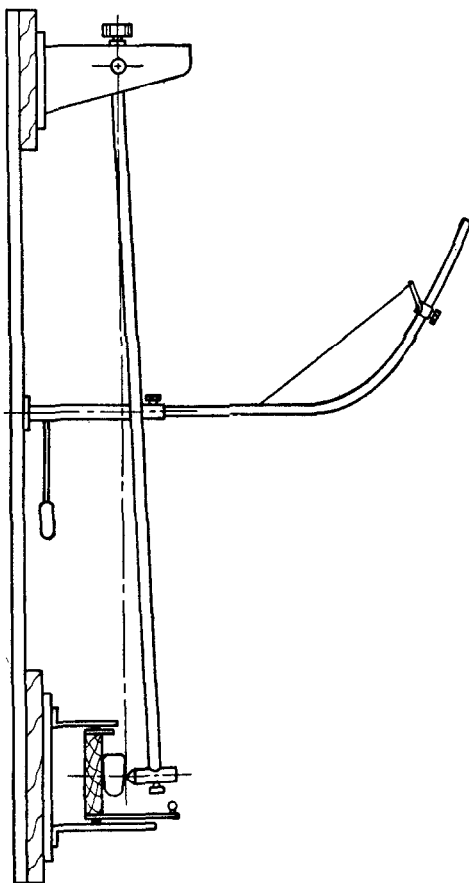


FIG. 7 IMPACT-TEST APPARATUS

The design of the apparatus is such that a force between 1.9 N and 2.0 N is to be applied upwards to the nose of the hammer to maintain the tube in a horizontal position.

The support for the sample is a sheet of plywood, 8 mm thick and 175 mm square, without any metallic backplate, the plywood being secured by means of its top and bottom edges to a rigid bracket.

The appartus is fixed to a solid wall of brick, concrete or the like.

The sample is held against the support in such a manner that its axis is horizontal and parallel to the support and its outer edge touches the support. The hammer hits the sample in a horizontal plane through the axis of the sample. For lampholders of insulating material, the shell is hit at the outer edge. For metal lampholders the shell is hit at the position of the ring of insulating material between the edison screw shell and the external parts. Furthermore, the point of impact lies in a vertical plane through the suspension axis of the pendulum.

The striking element falls from a height, measured vertically between the point of impact of the sample and the nose of the hammer at the point of release equal to:

- 10 cm for ceramic parts; and
- 15 cm for parts of other materials.

Five blows are applied to points equally divided over the circumference of the outer edge of the shell and of the ring.

At the end of the test, the sample shall show no serious damage within the meaning of this specification.

Candle lampholders if tested without decorative covers, are tested however, with a height of fall of 10 cm. For such candle lampholders, one blow is applied on two places at 90° along the circumference. The blows are applied at 5 mm from the outer edge of the lampholder.

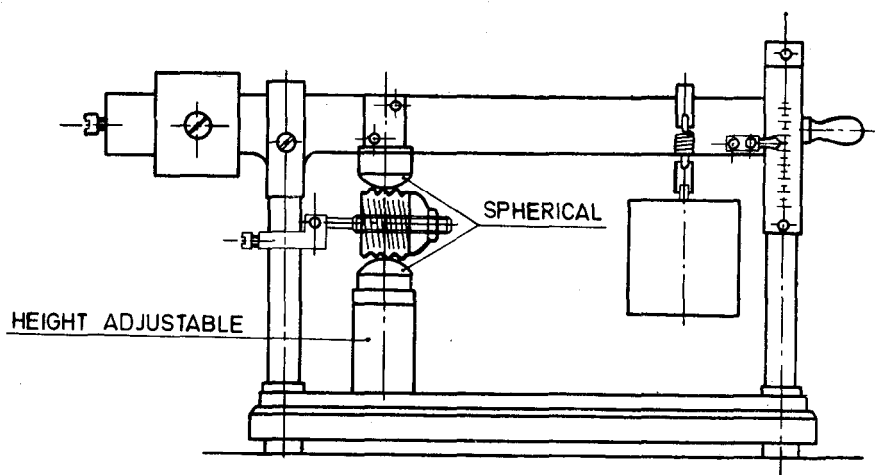
Cracks will be considered as faults only if they are visible to the naked eye. Provided that the protection against electric shock is not affected, small pieces may be detached without causing rejection.

Lampholders with parts of ceramic materials are not intended for use in portable luminaires except if they withstand the mechanical strength test, the hammer falling from a height of 15 cm.

NOTE — A revision of this test is under consideration.

**12.6.7** The mechanical strength of the metal outer case, screwed shell and dome is tested by means of an apparatus according to Fig. 8.

The various parts of the lampholder are tested separately. Each part is subjected twice for 1 min to a pressure as indicated in the table below, the pressure being applied on two diameters at right angles to each other. The test is not made on outer cases, screwed shells and domes of insulating material with a conductive outer surface.



Radius of hemisphere of pressure parts : 20 mm.

FIG. 8 PRESSURE APPARATUS

During and after the test, the deformation of the sample shall not exceed the values indicated in the following table:

Lampholder	Pressure N	Maximum Deformation ( mm )	
		During the test	After the test
E14	75	1	0.3
E27	100	2	0.3
E40	100	4	0.5

**12.6.8** Entry spouts and glands shall withstand the mechanical stresses occurring during normal fitting and use.

Compliance is checked by the following test:

Screwed glands are fitted with a cylindrical metal rod having a diameter equal to the nearest whole number of millimetres below the internal diameter of the packing. The glands are then tightened by means of a suitable spanner, force of 30 N for metal glands, or 20 N for glands of moulded material being applied for 1 min, at a radius of 25 cm.

At the end of the test, the glands, the spouts and the enclosures shall show no damage.

**12.6.9** Ring nipples, shade-carrier rings, cord grips and similar devices shall withstand the mechanical stresses occurring during normal use.

Details of the test are under consideration.

**12.6.10** Backplate lampholders shall be designed to withstand fixing to a support without damage.

Compliance is checked by the following test:

The backplate of the lampholder is fixed by means of 4 mm screws to a rigid flat steel sheet. This sheet has two drilled and tapped holes at a distance equal to the distance between the axis of the fixing holes of the backplate. The screws are gradually tightened, the maximum torque applied being 1.2 Nm.

After this test, the backplate lampholder shall show no damage impairing its further use.

## 12.7 Normal Operation

**12.7.1** Normal use shall cause no excessive wear or other harmful effect.

Insulation and protection against accidental contact shall not be seriously affected. Linings, barriers and the like shall have adequate mechanical strength and shall be reliably fixed.

Temperature rise and vibration to be expected in normal use shall not cause loosening of electrical connections.

**12.7.2** Compliance is checked by the following test:

Two braided and compounded single-core cables of the largest cross-sectional area specified for the lampholder are connected to the sample, which is placed in a test apparatus as shown in Fig. 9. A test cap is screwed in and out 100 times at a rate of about 15 times per minute, the dimension  $S$  being:

4.0 mm for lampholders E14;

7.7 mm for lampholders E27; and

9.0 mm for lampholders E40.

For the meaning of the dimension  $S$ , see Fig. 15, 16 and 17.

The lampholder is fixed during half the number of operations by the nipple, dome or backplate according to the type of lampholder, and during the other half clamped at the outer shell.

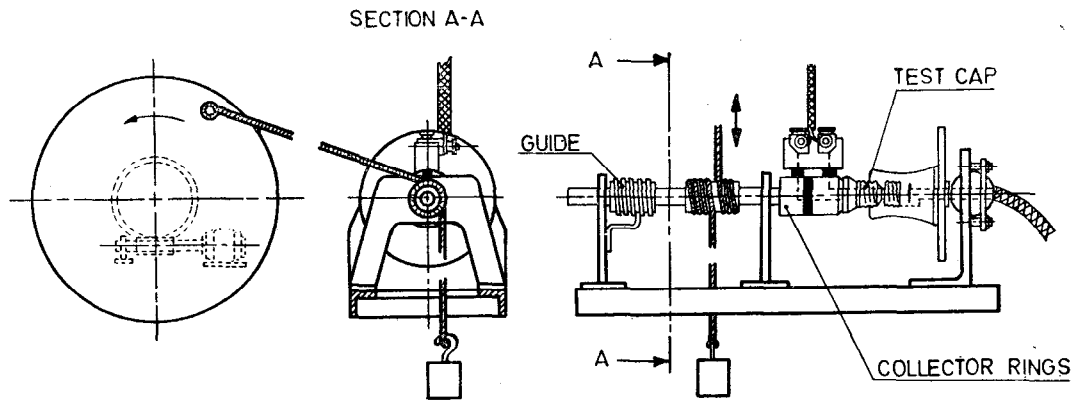


FIG. 9 NORMAL OPERATION-TEST APPARATUS

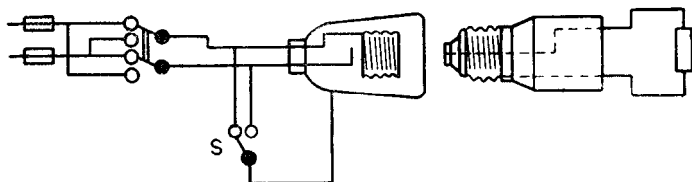


FIG. 10 WIRING DIAGRAM FOR NORMAL OPERATION TEST  
( APPARATUS OF FIGURE 5 )

In the case of lampholders E14 and E27, the test cap and lampholder carry at 250 V ac a non-inductive lead of:

1. A for lampholders E14; and
2. A for lampholders E27.

The test cap is screwed back sufficiently to interrupt the current at an average speed during interruption of approximately 90 rev/min.

**12.7.3** The wiring diagram for the tests is shown in Fig. 10. The switch *S* connecting accessible metal parts and the support ( in the case of backplate lampholders ) to one of the supply poles is thrown over after half-duration of the test.

In the case of lampholders E40, no current is passed.

- a) The test cap is screwed in with a torque of:
  - i) 0.4 Nm for candle lampholders E14;
  - ii) 1 Nm for lampholders E14;
  - iii) 1.5 Nm for lampholders E27; and
  - iv) 3 Nm for lampholders E40.
- b) At the end of the test, the sample shall show:
  - i) no wear impairing its operation;
  - ii) no damage impairing protection against electric shock;
  - iii) no loosening of electrical contacts;
  - iv) no loosening of the connection between shell and dome;
  - v) no loosening of the nipple screw; and
  - vi) no damage to the supply wires.

Finally the sample shall comply with the requirements of 6.2 and shall withstand an electric strength test according to 12.4 the test voltage being 500 V lower in each case.

The moisture treatment of 12.2.1 is not repeated before this voltage test.

## **12.8 General Resistance to Heat**

### **12.8.1 Lampholders shall be sufficiently resistant to heat.**

Compliance is checked by the tests of 12.8.2 to 12.8.4.

**12.8.2** A solid brass test cap A complying with Fig. 15, 16 or 17 is screwed into the lampholder mounting according to its intended use, with a torque as specified in the table below 12.8.2.1, and the voltage drop between the terminals of the lampholder is measured, at the rated current of the lampholders in an ac circuit of not more than 6 V; for switched-lampholders the voltage drop in the switch is neglected. The measured voltage drop shall not exceed the relevant value specified in that table.

**12.8.2.1** Test cap A is then replaced by a solid steel (preferably stainless steel) test cap B complying with Fig. 15, 16 or 17, which is screwed into the lampholder with the same torque.

The lampholder, with test cap B screwed home, is then placed in a heating cabinet maintained at the temperature specified in the table, and is loaded for 48 h with a current equal to the rated current of the lampholder.

After this period, the lampholder is removed from the heating cabinet and is allowed to cool down for 24 h without the test cap.

Test cap A is then screwed home into the lampholder again with the torque specified in the table below, and is unscrewed. This sequence of operations is made ten times after which the voltage drop is measured once more as specified above; it shall not exceed the relevant values specified in the following table:

<i>Lampholder</i>	<i>Torque Nm</i>	<i>Test Temperature °C</i>	<i>Voltage Drop mV</i>	
			Before the Test	After the Test
E14	1	120	15	40
E27	1.5	175	15	40
E40	3	240	30	60

After this test, the sample shall comply with 6.2.

NOTE 1 — Test cap A is carefully cleaned and polished before screwing it into the lampholder for both voltage-drop measurement.



NOTE 2 — Test cap A has the minimum acceptable dimensions and dimensions at the side of the central contact according to those specified in the standard sheets 7006-30( E14 ), 7006-21( E27 ) or 7006-23( E40 ) of Part II of this standard, the dimensions *S*, however, being:

- 4.5 mm for lampholders E14;
- 8.5 mm for lampholders E27; and
- 10.0 mm for lampholder E40.

NOTE 3 — Test cap B has the maximum acceptable dimensions and dimensions at the side of the central contact according to those specified in the standard sheets 7006-31( E14 ), 7006-22( E27 ) or 7006-24( E40 ) of Part II of this standard, the dimensions *S*, however, being:

- 4.0 mm for lampholders E14;
- 7.7 mm for lampholders E27; and
- 9.0 mm for lampholders E40.

**12.8.3** Contacts and all other current-carrying parts shall be so constructed as to prevent excessive temperature rise.

**12.8.3.1** Compliance is checked by the following test which is made immediately after the test of **12.8.2** on the lampholder in whose terminals conductors of the maximum cross-sectional area according to **9.1** are fitted.

The terminal screws are tightened with a torque equal to two-thirds of the specified torque, the lampholder is placed with the open end downwards and loaded for 1 h with one and a half times its rated current. The temperature rise of contacts and other current-carrying parts shall not exceed 45°C at any point.

The temperature is determined with the aid of melting particles or by thermocouples, not by means of thermometers.

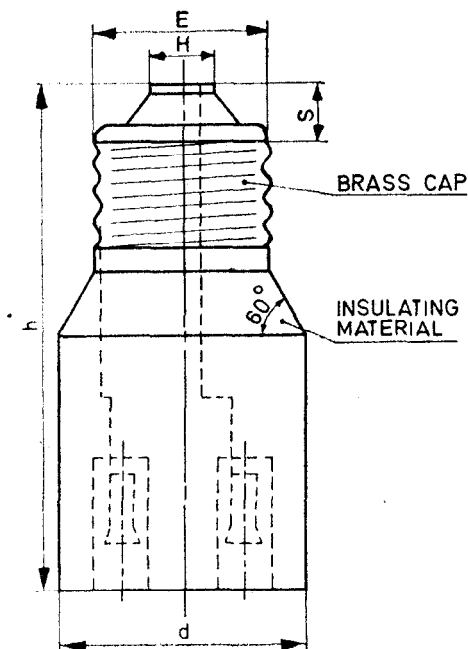
For this test, a special test cap shown in Fig. 11 is used.

After the test, it is verified that the conductors are not damaged.

**12.8.4** The resistance to heat is then tested in a heating cabinet at the temperature indicated in the table below:

<i>Lampholder</i>	<i>Temperature</i> °C
E14	150
E27	200
E40	300

A solid steel ( preferably stainless steel ) test cap B, complying with Fig. 15, 16 or 17 is screwed fully home in the lampholder. The test is continued for seven times 24 h without interruption. The test temperature is maintained with a tolerance of  $\pm 5^\circ\text{C}$ .



All dimensions in millimetres

LAMPHOLDER	CAP	$d$	$h$	H	S*	E
E14	E14/25 × 17	38	80	6.2	4.5	12
E27	E27/27	38	80	11.5	8.5	23
E40	E40/45	55	110	18.0	10.0	34

\*For the meaning of the dimension S, see Fig. 15, 16 or 17.

The dimensions of the thread on the test cap must be between the maximum and minimum values specified in the relevant standards.

FIG. 11 TEST CAP FOR THE TESTS OF 12.4.2 AND 12.8.3.1

During the test, the lampholder shall not undergo any change impairing its further use especially in the following respects:

- a) reduction of the protection against electric shock;
- b) loosening of electrical contacts;
- c) cracks, swelling or shrinking; and
- d) sealing compound flowing out.

At the end of the test, it is checked if the edison threads are not deformed. The test is made by means of the 'go' gauges shown in the standard sheets 7006-25 or 25A of Part II of this standard as appropriate.

In addition the holder shall withstand the mechanical strength tests made under the conditions specified in 12.6.2 and 12.6.6 the torque, however, being reduced to 50 percent of the original value and the height of all being reduced to 5 cm, respectively.

NOTE 1 — Sealing compound shall not flow to such an extent that live parts are exposed; a mere displacement of the compound is neglected.

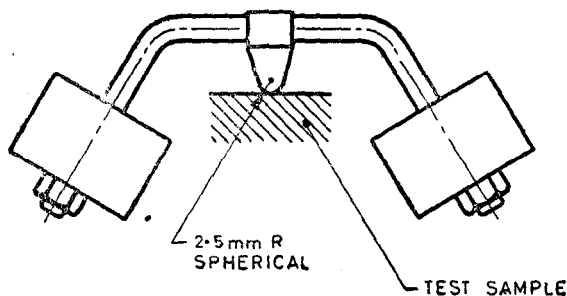
NOTE 2 — The use of the gauge is not intended for checking the reality of the contact, but only for checking the possible deformation of moulded materials.

NOTE 3 — The test is not made on luminaires.

## 12.9 Resistance to Heat Fire and Tracking

12.9.1 Parts carrying the contacts and external parts of lampholders of insulating material and of lampholders comprising external parts of insulating material with a conductive outer surface shall be resistant to heat.

Compliance is checked with the aid of the ball-pressure test by means of the apparatus shown in Fig. 12.



All dimensions in millimetres.

FIG. 12 BALL PRESSURE APPARATUS

The surface of the part under test is placed in the horizontal position and a steel ball of 5 mm diameter is pressed against this surface by a

force of 20 N. This test is made in a heating cabinet at the temperature shown in 12.8.4.

After 1 h, the ball is removed from the sample which is then cooled down, within 10 s, to approximately room temperature by immersion in cold water. The diameter of the impression caused by the ball is measured and shall not exceed 2 mm.

NOTE — The test is not made on parts of ceramic material.

### 12.9.2 *Non-flammability Test*

**12.9.2.1 Preparation of sample** — The specimen shall consist of a portion of insulating material and shall weight not less than 6 g nor more than 10 g, and shall be not more than 10 mm in thickness when measured from an externally cured face.

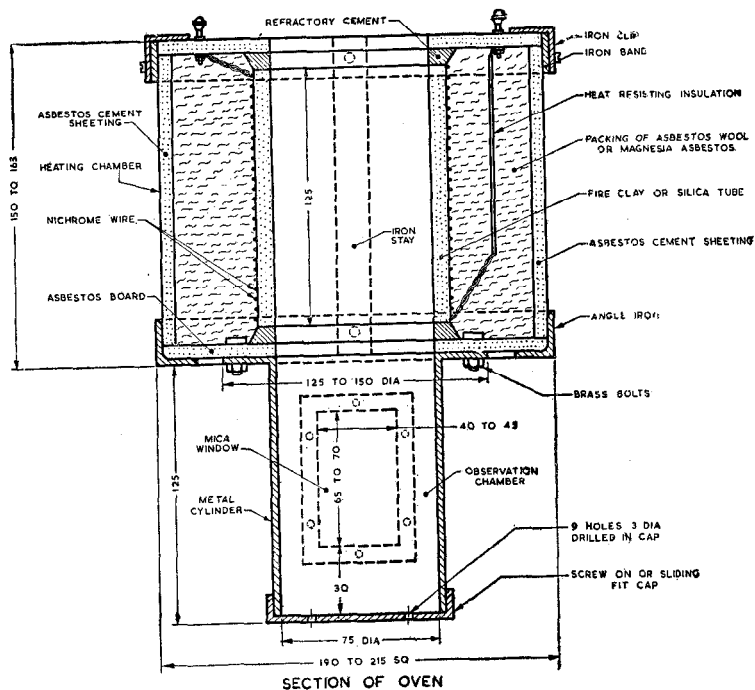
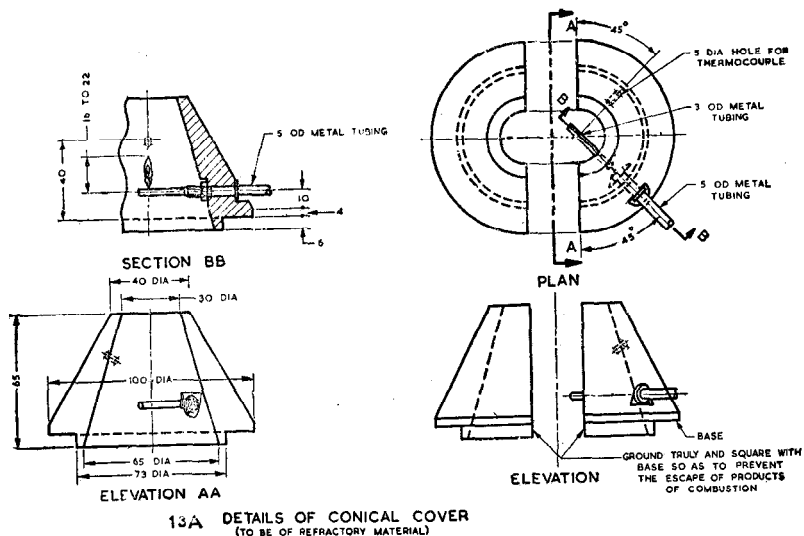
**12.9.2.2 Apparatus** — The specimens shall be tested in the heating tube of an apparatus of the general type shown in Fig. 13, the pilot flame being located 20 mm above the upper end of the specimen.

A support for the specimen shall be provided in the heating tube, and this may suitably consist of a light stirrup of nichrome wire, supported by a length of nichrome wire passing over the pilot flame tube. The support shall be such that the specimen is fixed centrally in the heating tube, with its largest dimension vertical.

The apparatus shall be heated by passing a suitably regulated electric current through a nichrome resistance wire surrounding the heating tube.

**Measurement of Temperature of Tube** — The temperature of the tube shall be taken as shown by a thermocouple situated at the level of the centre of the specimen and equidistant from the inner surface of the heating tube and the specimen. The wires of which the thermocouple is made shall not be larger than 1.25 mm and not smaller than 0.45 mm, and shall be bare for a length of 25 mm from the junction.

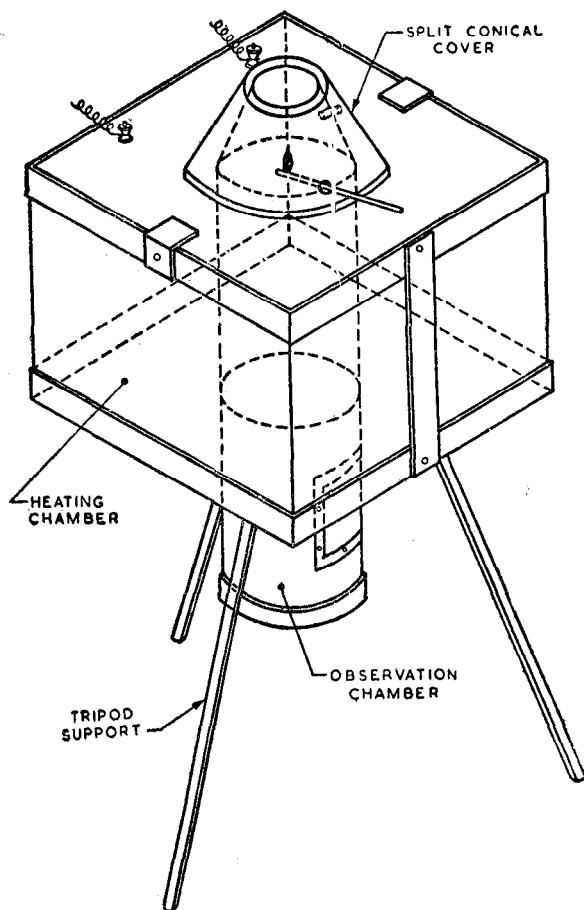
**12.9.2.3 Test for non-flammability** — The temperature of the tube shall be raised to 300°C and the specimen shall then be re-adjusted to 300°C within a period of three minutes, and this temperature shall be maintained until a period of five minutes has elapsed from the time of insertion of the specimen. During this period of five minutes, a conical cover at the top shall limit the opening to approximately 6.5 cm<sup>2</sup> while the air intake orifice at the bottom shall be open approximately 0.65 cm<sup>2</sup>. At the end of the period of five minutes the specimen shall be removed from the tube. The material shall not be deemed non-flammable if at any time during the test the specimen flames or gives off flammable vapours in sufficient quantities to ignite at the pilot flame.



**13B Details of Test Oven**

All dimensions in millimetres.

**FIG.13 APPARATUS FOR NON-FLAMMABILITY TEST — Contd**



13C Sketch of Assembled Apparatus

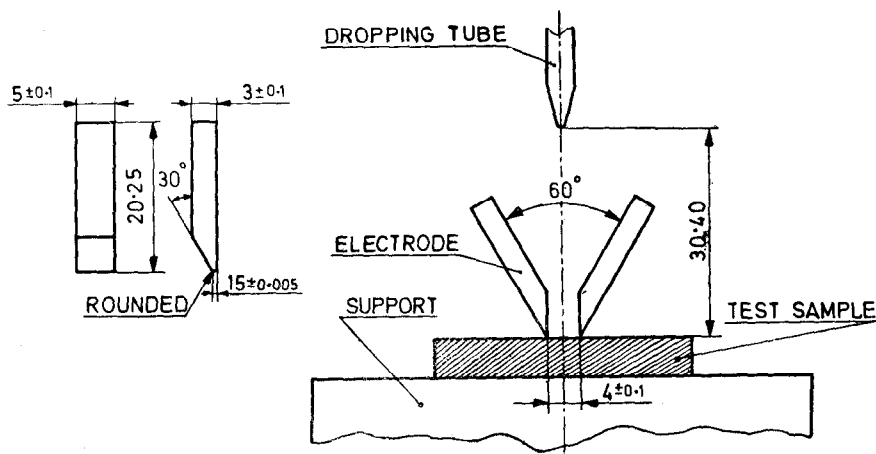
FIG. 13 APPARATUS FOR NON-FLAMMABILITY TEST

**12.9.3** For drip-proof lampholders, insulating parts supporting live parts shall be of ceramic or other non-tracking material.

For materials other than ceramic, compliance is checked by the following tests:

A flat surface, if possible at least 15 mm × 15 mm, of the sample to be tested is placed in the horizontal position.

Two electrodes of platinum, with the dimensions shown in Fig. 14, are placed on the surface of the sample in the manner shown in this figure, so that the rounded edges are in contact with the sample over their whole length.



All dimensions in millimetres.

FIG. 14 DIMENSIONS AND ARRANGEMENT OF THE ELECTRODES FOR THE TRACKING TEST

The force exerted on the surface by each electrode is about 1 N.

The electrodes are connected to a 50 Hz or 60 Hz supply source having a voltage of 175 V of substantially sine-wave form. The total impedance of the circuit when the electrodes are short-circuited is adjusted by means of a variable resistor so that the current is  $1.0 \pm 0.1$  A with  $\cos \varphi = 0.9$  to 1. An overcurrent relay, with a tripping time of at least 0.5 s, is included in the circuit.

The surface of the sample is wetted by allowing drops of a solution of ammonium chloride in distilled water to fall centrally between the electrodes.

The solution has a volume resistivity of  $400 \Omega \text{ cm}$  at  $25^\circ\text{C}$ , corresponding to a concentration of about 0.1 percent.

The drops have a volume of  $20 \pm \frac{5}{0} \text{ mm}^3$  and fall from a height of 30 to 40 mm.



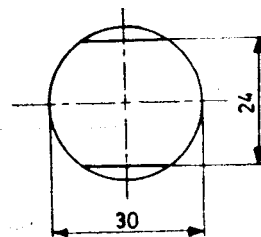
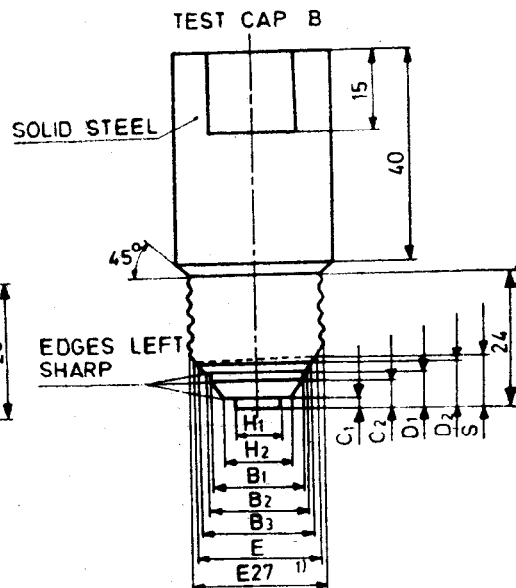
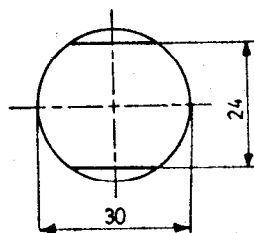
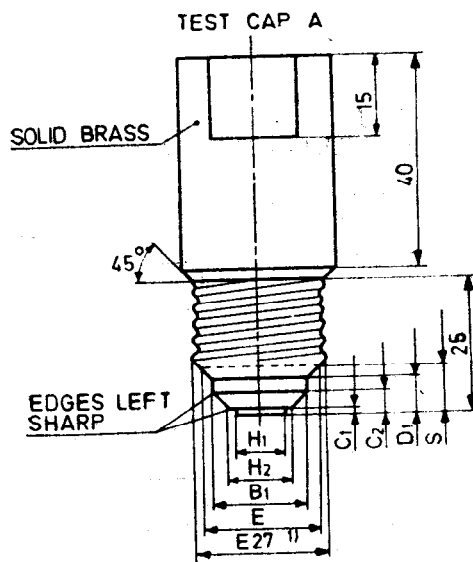


All dimensions in millimetres.

REFERENCE	DIMENSIONS		TOLERANCES	
	Test Cap A	Test Cap B	Test Gap A	Test Gap B
C1	0.5	1.0	0 -0.1	0 -0.1
C2	2.5	3.0	0 -0.1	0 -0.1
D	3.5	—	+0.1 0	—
S	4.5	4.0	+0.06 0	0 -0.06
H1	4.8	4.8	+0.04 -0.04	+0.04 -0.04
H2	6	6	+0.04 -0.04	+0.04 -0.04
B	10	10	+0.04 0	+0.06 0
E	12	12	—	—
Y	—	45°	—	+10 -10

- 1) The dimensions of the thread on the test caps A and B must be between the maximum and minimum values specified in Standard sheet 7004-23 of IEC Publication 61.

FIG. 15 TEST CAP A AND TEST CAP B FOR THE TESTS OF 12.8.2 AND 12.8.4 FOR LAMP HOLDERS E14



All dimensions in millimetres.

REFERENCE	DIMENSIONS		TOLERANCES	
	Test Cap A	Test Cap B	Test Cap A	Test Cap B
C1	0.5	1.2	0 -0.04	0 -0.04
C2	3.5	4.2	0 -0.06	0 -0.06
D1	6.25	5.45	+0.1 0	+0.1 0
D2	—	7.2	—	+0.1 0
S	8.5	7.7	+0.04 0	0 -0.04
H1	9.5	9.5	+0.04 -0.04	+0.04 -0.04
H2	12.5	12.5	+0.04 -0.04	+0.04 -0.04
B1	18.5	18.5	+0.06 0	+0.06 0
B2	—	20	—	+0.06 0
B3	—	22	—	+0.06 0
E	23	23	—	—

- 1) The dimensions of the thread on the test caps A and B must be between the maximum and minimum values specified in Standard sheet 7004-21 of IEC Publication 61.

FIG. 16 TEST CAP A AND TEST CAP B FOR THE TESTS OF 12.8.2 AND 12.8.4 FOR LAMP HOLDERS E27



All dimensions in millimetres.

REFERENCE	DIMENSIONS		TOLERANCES	
	Test Cap A	Test Cap B	Test Cap A	Test Cap B
C1	0.5	1.5	0 -0.1	0 -0.1
C2	6	7	0 -0.1	0 -0.1
D	8	—	+0.1 0	—
S	10	9	+0.06 0	0 -0.06
H1	14	14	+0.04 -0.04	+0.04 -0.04
H2	19	19	+0.04 -0.04	+0.04 -0.04
	30	30	+0.06 0	+0.06 0
E	34	34	—	—
	—	45°	—	+10' -10'

- 1) The dimensions of the thread on the test caps A and B must be between the maximum and minimum values specified in Standard sheet 7004-24 of IEC Publication 61.

FIG. 17 TEST CAP A AND TEST CAP B FOR THE TESTS OF 12.8.2 AND 12.8.4 FOR LAMP HOLDERS E40

The time interval between one drop and the next is  $30 \pm 5$  s.

No flashover or breakdown between electrodes shall occur before a total of 50 drops have fallen.

The test is made at three places on the sample or on three samples.

NOTE 1 — Care should be taken that the electrodes are clean, correctly shaped and correctly positioned before each test is started.

NOTE 2 — In case of doubt, the test is repeated, if necessary on a new sample or set of samples.

NOTE 3 — Screwed shells which are only alive when a lamp is inserted into the lampholder are not deemed to be live parts for the purpose of this test.

NOTE 4 — Parts of insulating material mounted on ceramic parts are deemed to be ceramic material if the minimum creepage distance prescribed in are available on the parts of ceramic material.

## 12.10 Resistance to Season Cracking and to Rusting

**12.10.1** Parts of copper or copper alloy shall be resistant season cracking.

Compliance is checked by the following test:

The surface of the samples is carefully cleaned, varnish being removed by acetone, grease and finger prints by petroleum spirit or the like. The samples are kept for 1 h at a temperature of  $27 \pm 5^\circ\text{C}$  in a solution of mercury chloride ( $\text{HgCl}_2$ ) saturated at this temperature.

After this treatment, the samples are washed in running water; 24 h later, the samples shall not show any cracks visible to the naked eye.

In order to influence the results of the test, the sample must be handled with care.

**12.10.2** Ferrous parts shall be adequately rust protected.

Compliance is checked by the following test:

All grease is removed from parts to be tested for rust protection by immersion in carbon tetrachloride for 10 min. The samples are then immersed for 10 min in a water solution of 10 percent ammonium chloride at a temperature of  $27 \pm 5^\circ\text{C}$ . Without drying, but after shaking off drops of water, the parts are then placed for 10 min in a box containing air saturated with moisture at the temperature of  $27 \pm 5^\circ\text{C}$ . Immediately after the samples have been dried for 10 min in a heating cabinet at a temperature of  $100 \pm 5^\circ\text{C}$ , their surfaces shall show no signs of rust.

**APPENDIX A**

( Clause 12.0.2.1 )

**SAMPLING PROCEDURE FOR EDISON  
SCREW LAMPHOLDERS****A-1. SCALE OF SAMPLING**

**A-1.1 Lot** — In a consignment, all the lampholders of the same rating manufactured from same material in the same factory under similar conditions of production shall be grouped together to constitute a lot.

**A-1.2** The number of lampholders to be selected from each lot shall depend upon the size of the lot and shall be in accordance with col 1 and 2 of Table 1:

**TABLE 1 SAMPLE SIZE AND ACCEPTANCE NUMBER**

( Clauses A-1.2, A-2.1 and A-2.2 )

LOT SIZE	FOR VISUAL EXAMINATION DIMENSIONAL CHECKING, INSULATION RESISTANCE TEST AND HIGH VOLTAGE TEST		FOR OTHER ACCEPTANCE TESTS	
			Sample Size	Acceptance Number
	Sample Size	Acceptance Number		
(1)	(2)	(3)	(4)	(5)
301 to 500	20	1	8	0
501 „ 1 000	32	2	13	0
1 001 and above	50	3	20	1

**A-1.2.1** These lampholders shall be selected from the lot at random. In order to ensure the randomness of selection, procedures given in IS : 4905-1963\* may be followed.

**A-2. NUMBER OF TESTS AND CRITERIA FOR CONFORMITY**

**A-2.1** The lampholders as selected according to col 1 and 2 of Table 1 shall be subjected to visual examination, dimension checking, insulation resistance test and high voltage test. A lampholder failing to meet any of these requirements shall be termed as defective. The lot shall be

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\*Methods for random sampling.

considered as conforming to these requirements if the number of defectives found in the sample is less than or equal to the corresponding acceptance number given in col 3 of Table 1; otherwise the lot shall be rejected without further testing.

**A-2.2** The lot which has been found as conforming to the above requirements shall then be tested for resistance to heat and resistance to season cracking and rusting. For this purpose the sample sizes and acceptance numbers are given in col 4 and 5 of Table 1.

**A-2.3** The lot shall be considered as conforming to the requirements of acceptance tests if **A-2.1** and **A-2.2** are satisfied.



(Continued from page 2)

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Peico Electronics & Electricals Ltd, Bombay

National Physical Laboratory ( CSIR ), New Delhi

Hind Lamps Ltd, Shikohabad

Central Public Works Department, New Delhi

Electric Lamp and Component Manufacturers Association of India, Bangalore

# INDIAN STANDARDS

## ON

### ELECTRIC LAMPS AND ACCESSORIES

IS:

- 418-1978 Tungsten filament general service electric lamps (*third revision*)
- 897-1980 Tungsten filament electric lamps for railway rolling stock (*second revision*)
- 1258-1979 Bayonet lampholders (*second revision*)
- 1534 (Part I)-1977 Ballasts for fluorescent lamps : Part I For switch start circuits (*second revision*)
- 1569-1976 Capacitors for use in tubular fluorescent, high pressure mercury and low pressure sodium vapour discharge lamp circuits (*first revision*)
- 1606-1979 Automobile lamps (*second revision*)
- 1885 (Part XVI/Sec 3)-1967 Electrotechnical vocabulary: Part XVI Lighting, Section 3 Lamps and auxiliary apparatus
- 1901-1978 Visual indicator lamps (*first revision*)
- 2215-1968 Starters for fluorescent lamps (*second revision*)
- 2261-1975 Lamps for flashlights (*first revision*)
- 2262-1963 Transformers for high voltage luminous discharge tubes
- 2407-1963 Photometric integrators
- 2418 Tubular fluorescent lamps for general lighting service:
  - (Part I)-1977 Requirements and tests (*first revision*)
  - (Part II)-1977 Standard lamp data sheets (*first revision*)
  - (Part III)-1977 Dimensions of G-5 and G-13 bi-pin caps (*first revision*)
  - (Part IV)-1977 Go and no-go gauges for G-5 and G-13 bi-pin caps (*first revision*)
- 2592-1980 Lamps for lighting on board ships (*first revision*)
- 2596-1980 Bulbs (lamps) for miners' cap-lamps (*first revision*)
- 3323-1980 Bi-pin lampholders for tubular fluorescent lamps (*first revision*)
- 3324-1982 Holders for starters for tubular fluorescent lamps (*first revision*)
- 6616-1982 Ballasts for high pressure mercury vapour lamps (*first revision*)
- 6701-1972 Tungsten filament miscellaneous electric lamps
- 7013-1981 Schedule for radio dial lamps
- 7027-1973 Transistorized ballasts for fluorescent lamps
- 8685-1977 Aircraft lamps
- 8901-1978 Lamps for aerodrome lighting fittings
- 8913-1978 Method of measurement of lamp cap temperature rise
- 9206-1979 Dimensions of caps for tungsten filament general service electric lamps
- 9900 High pressure mercury vapour lamps :
  - (Part I)-1981 Requirements and tests
  - (Part II)-1981 Standard lamp data sheets
  - (Part III)-1981 Dimensions of lamp caps
  - (Part IV)-1981 'Go' and 'No go' gauges of lamp caps
- 9974 High pressure sodium vapour lamps :
  - (Part I)-1981 General requirements and tests
  - (Part II)-1981 Standard lamp data sheets